

CLAIMS:

1. Method of writing information to a record medium, wherein 152 code words [11(j)] each having 248 bytes [m1(i,j)] and 12 BIS words each having 62 BIS bytes [b2(r,s)] are combined so as to form an ECC block (M3) having 38440 elements [m3(v,w)], which elements are consecutively written to said medium.
 - 5 2. Method of writing information to a record medium, comprising the following steps:
 - (a) calculating a predetermined number (Ne) of error correction bytes (Be) on the basis of a predetermined number (Nd) of data bytes (Bd) so as to form a code word (11) of
 - 10 248 code word bytes;
 - (b) repeating step (a) until 152 of said code words [11(j)] have been formed, each comprising 248 code word bytes [m1(i,j)],
j representing an index ranging from 0 to 151,
i representing an index ranging from 0 to 247;
 - 15 (c) generating 3 BIS lines [BL(s)] each comprising 248 BIS bytes [b2(r,s)],
s representing an index ranging from 0 to 2,
r representing an index ranging from 0 to 247;
 - (d) writing the combination of 152x248 code word bytes [m1(i,j)] and 3x248 BIS bytes [b2(r,s)] in an order obtainable by:
 - 20 (d1) placing the 152 code words [11(j)] as columns in a 152x248 first matrix (M1) having first matrix elements [m1(i,j)];
 - (d2) performing a predefined cyclic row shift operation on this first matrix (M1) so as to obtain a 152x248 second matrix (M2) having second matrix elements [m2(t,u)];
 - (d3) placing the second matrix elements [m2(t,u)] of this second matrix (M2) at
 - 25 location [m3(v,w)] of a 155x248 third matrix (M3) in accordance with the following formulas:
- $$v = t$$
- $$w = u + \text{DIV}(u, 38)$$

(d4) placing the BIS bytes $[b_2(r,s)]$ at location $[m_3(v,w)]$ of said 155x248 third matrix (M3) in accordance with the following formulas:

$$v = r$$

$$w = 39*s + 38$$

- 5 (d5) writing the elements $[m_3(v,w)]$ of said 155x248 third matrix (M3) in a row-by-row fashion in accordance with the following formula:

$$B(\xi) = m_3(\text{DIV}(\xi, 155), \text{MOD}(\xi, 155)), \text{ wherein}$$

$B(\xi)$ indicates the ξ -th byte to be written, ξ being an index ranging from 0 to 38 439.

- 10 3. Method according to claim 2, wherein said cyclic row shift is performed in accordance with the following formulas:

$$t = i$$

$$u = \text{MOD}(j - \text{MOD}(3*i, 152) + 152, 152)$$

- 15 4. Method according to claim 2, further comprising the steps of:
generating 12 BIS code words, each having 62 BIS bytes $[b_{\text{BIS}}(n,c)]$,
 c representing an index ranging from 0 to 11,
 n representing an index ranging from 0 to 61;
and generating said 3 BIS lines $[BL(s)]$ by combining 4 of said BIS code words so as to form
20 a BIS line.

5. Method according to claim 4, wherein a relationship between said BIS bytes $[b_2(r,s)]$ of said 3 BIS lines $[BL(s)]$ on the one hand and said BIS bytes $[b_{\text{BIS}}(n,c)]$ of said 12 BIS code words on the other hand complies with the following formulas:

- 25 $b_2(r,s) = b_{\text{BIS}}(n,c)$, with:

$$s = \text{MOD}(\{c + 30 - \text{DIV}(n, 2)\}, 3) \text{ and } r = 31*uu + \text{DIV}(n, 2), \text{ wherein } uu = \text{MOD}(\{\text{DIV}(n, 2) + 4 - \text{DIV}(c, 3)\}, 4) + 4*\text{MOD}(n, 2)$$

6. Method according to claim 4, further comprising the steps of:
30 generating 8 address words each having 9 address bytes $[AF(x,y)]$,
 x representing an index ranging from 0 to 7,
 y representing an index ranging from 0 to 8;
putting said address bytes $[AF(x,y)]$ into said 12 BIS code words, wherein a relationship between said address bytes $[AF(x,y)]$ of said address words on the one hand and said BIS

bytes $[b_{BIS}(n,c)]$ of said 12 BIS code words on the other hand complies with the following formulas:

$b_{BIS}(n,c) = AF(x,y)$ with:

$n = 2 * DIV(x,3) + DIV(y,4)$

5 $c = 3 * MOD(\{DIV(x,3) + 8 - y\},4) + MOD(\{x + DIV(x,3)\},3)$

7. Method of reading information from a record medium, wherein an ECC block (M3) having 38 440 elements $[m3(v,w)]$ is read, from which 152 code words $[11(j)]$ each having 248 bytes $[m1(i,j)]$ and 12 BIS words each having 62 BIS bytes $[b_2(r,s)]$ are
10 reconstructed.

8. Method of reading information from a record medium, comprising the following steps:

(a) reading 38 440 consecutive bytes $[B(\xi)]$,

15 ξ representing an index ranging from 0 to 38439;

(b) reconstructing 152 code words $[11(j)]$ from said read bytes $[B(\xi)]$, each code word comprising 248 code word bytes $[m1(i,j)]$,

j representing an index ranging from 0 to 151,

i representing an index ranging from 0 to 247;

20 wherein a relationship between said code word bytes $[m1(i,j)]$ on the one hand and said read bytes $[B(\xi)]$ on the other hand complies with the following formulas:

$m1(i,j) = B(\xi)$, with $\xi = i * 155 + u + DIV(u,38)$

wherein $u = MOD(j - MOD(3*i,152) + 152,152)$

25 9. Method according to claim 8, wherein, the 248 bytes are submitted to an error correction processing in each code word $[11(j)]$ thus reconstructed;

and wherein a predetermined number (N_d) from among the corrected bytes are outputted as data bytes (B_d).

30 10. Method according to claim 8, further comprising the step of reconstructing 12 BIS words from said read bytes $[B(\xi)]$, each BIS word comprising 62 BIS bytes $[b_{BIS}(n,c)]$; c representing an index ranging from 0 to 11, n representing an index ranging from 0 to 61;

wherein a relationship between said BIS bytes $[b_{BIS}(n,c)]$ on the one hand and said read bytes $[B(\xi)]$ on the other hand complies with the following formulas:

$$b_{BIS}(n,c) = B(\xi), \text{ with } \xi = r \cdot 155 + 39 \cdot s + 38$$

wherein: $s = \text{MOD}(\{c + 30 - \text{DIV}(n,2)\}, 3)$

5 $r = 31 \cdot uu + \text{DIV}(n,2)$

with $uu = \text{MOD}(\{\text{DIV}(n,2) + 4 - \text{DIV}(c,3)\}, 4) + 4 \cdot \text{MOD}(n,2)$

11. Method according to claim 10, further comprising the step of reconstructing 8 address words from said reconstructed BIS words, each address word comprising 9 address
10 bytes $[AF(x,y)]$;

x representing an index ranging from 0 to 7,

y representing an index ranging from 0 to 8;

wherein a relationship between said address bytes $[AF(x,y)]$ on the one hand and said BIS bytes $[b_{BIS}(n,c)]$ on the other hand complies with the following formulas:

15 $AF(x,y) = b_{BIS}(n,c), \text{ with } n = 2 \cdot \text{DIV}(x,3) + \text{DIV}(y,4)$

$$c = 3 \cdot \text{MOD}(\{\text{DIV}(x,3) + 8 - y\}, 4) + \text{MOD}(\{x + \text{DIV}(x,3)\}, 3)$$

12. Information recording/reading apparatus (1) designed to write information to a record medium (2) in accordance with any of claims 1-6, or to read information from a record
20 medium (2) in accordance with any of claims 7-11, respectively.

13. Record carrier (2) containing information written by a method in accordance with any of claims 1-6.